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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/880,757	06/15/2001	Kiyotaka Wasa	35.C15462	5938

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EXAMINER

TUGBANG, ANTHONY D

ART UNIT	PAPER NUMBER
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3729

19

DATE MAILED: 12/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/880,757

Applicant(s)

WASA ET AL.

ad

Examiner

A. Dexter Tugbang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-28 and 61-85 is/are pending in the application.
- 4a) Of the above claim(s) 24-28, 61-72, 84 and 85 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 73-83 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The applicants' amendments filed on both 8/8/03 (Paper No. 17) and 10/3/03 (Paper No. 18) have each been fully considered and made of record.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Election/Restrictions

3. Claims 24-28 and 61-72 continue to stand as being withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 14.
4. The applicants' amendment (Paper No. 18) has necessitated a restriction to one of the following inventions as required under 35 U.S.C. 121:
 - I. Claims 73-83, drawn to method of manufacturing piezoelectric element structure having first and second layers, classified in class 29, subclass 830.
 - II. Claims 84-85, drawn to a method of manufacturing a piezoelectric element structure having only one, single layer, classified in class 29, subclass 25.35.

The inventions are distinct, each from the other because of the following reasons:

5. Inventions of Groups I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, the invention of Group II has separate utility such as a

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piezoelectric structure with only one, single layer on the supporting structure, not requiring any composition of zirconium or not requiring any interconnection with any second layer on the supporting substrate. See MPEP § 806.05(d).

6. Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

7. Newly submitted Claims 84-85 are directed to an invention that is independent or distinct from the invention originally claimed for the reasons set forth above.

Since applicant has received an action on the merits for the originally presented invention (Group I), this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, Claims 84-85 have been withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

8. Claims 73, 74, 79-81 and 83 are rejected under 35 U.S.C. 102(b) as being anticipated by Moynihan et al 5,500,988.

Moynihan discloses a method of manufacturing a piezoelectric element comprising: forming on a support substrate 10 (in Fig. 1); a first layer (electrodes 17) having a perovskite structure and a second layer having a perovskite structure and zirconium (see col. 1, lines 14-16); forming the first and second layers to 800 °C with the first layer having no element of zirconium (see col. 4, lines 31-37) that is required in the second layer; and cooling from the formation temperature of 800 °C to normal room temperature (see col. 3, lines 29-42). The range of

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cooling of Moynihan, i.e. from 800 °C to normal room temp., overlaps the claimed range of “at least to 450 °C”. The cooling speed of Moynihan can be calculated to approximately 1560 °C/min, which satisfies the claimed speed of “at least 30 °C/minute”.

Regarding Claim 74, the “intermediate layer” is read as layer 24 and since the first layer 17 has no zirconium composition and the second layer has a zirconium composition, the concentration from first layer to second layer can be said to be increased inclinarily.

Regarding Claims 79-81, Moynihan further teaches forming the second layer in a range of 1-25 µm, which overlaps the ranges of the claimed second layer in each of Claims 79 and 80, as well as the first layer 17 being formed at 0.2 µm (see col. 4, lines 31-38), which satisfies the range of Claim 81.

Regarding Claim 83, the claimed “element for preventing crystallization growth during a thin film process” (lines 5-6) is alternatively read as electrode layer 17.

Claim Rejections - 35 USC § 103

9. Claims 75-78 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moynihan et al in view of European Patent Publication EP 0 930 165, referred to hereinafter as EP’165.

Moynihan discloses the claimed manufacturing method as previously discussed. Moynihan does not teach the detailed features as recited in each of Claims 75-78 and 82.

Regarding Claim 75, EP’165 teaches a piezoelectric manufacturing process having at least one example of a zirconium/titanium ratio of 50/50 (see col. 8, lines 54-56). The advantage

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of the EP'165 manufacturing process provides high piezoelectric characteristics with thin piezoelectric films (see col. 2, lines 8-12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Moynihan by including the manufacturing process of EP'165, to advantageously provide high piezoelectric characteristics with thin piezoelectric films.

Regarding Claims 76, 77, 78 and 82, the crystal orientation of the piezoelectric element, i.e. mono-orientational, (100) direction orientation, or (111) direction orientation, are all considered to be effective variables within the level of ordinary skill in the art of forming piezoelectric thin films and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a crystal orientation of a mono-orientational, (100) direction orientation, or (111) direction orientation, since it has been held that discovering optimum values of result effective variables involve only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Response to Arguments

10. Applicant's arguments filed 10/3/03 (Paper No. 18) have been fully considered but they are not persuasive.

With respect to the merits of the applied prior art in the previous Office Action (Paper No. 15), the applicants' argue that the applied art, either alone or in combination, does not teach forming on the supporting substrate a first layer having a perovskite structure and a second layer having a perovskite structure and zirconium or an element, with a temperature at a time of

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formation of the first and second layers being at least 500 C. The applicants' place a great deal of emphasis on the phrase of "a temperature at a time of formation".

The examiner most respectfully disagrees for the following reasons. The above claimed feature was relied upon in Moynihan et al. While the examiner agrees with the applicants' assertion that Moynihan teaches depositing the PZT layer and then annealing by heating (page 11 of the amendment filed 10/3/03, Paper No. 18), these dual steps of Moynihan are not excluded by the claim limitations. In other words, the limitations of "a temperature at a time of formation" as this relates to the formation of the first and second layers, do not exclude the number of steps needed to reach the temperature of at least 500 C to achieve crystallization growth. The "forming..." steps (lines 4-8 of Claim 73 and lines 4-9 of Claim 83) are very broad limitations and are fully satisfied by the depositing and annealing steps of Moynihan et al regarding the claimed "first and second layers".

Accordingly, the examiner maintains the rejection of Claims 73-83 in the previous Office Action (Paper No. 15).

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. This application contains Claims 24-28, 61-72 and 84-85 drawn to an invention nonelected with traverse in Paper No. 13. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Dexter Tugbang whose telephone number is 703-308-7599. The examiner can normally be reached on Monday - Friday 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9302.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0858.



A. Dexter Tugbang
Primary Examiner
Art Unit 3729

December 12, 2003